

Customer Code:

DATASHEET

DAPU P/N: CM22B-G328-10.00MHz

Customer P/N: _____

| DAPU | | | Customer Approval |
|------------------|---------|----------|------------------------|
| Drew | Audited | Approved | Stamp, please! Thanks! |
| | | | |
| Date: 2022.03.24 | | | |

Guangdong Dapu Telecom Technology Co., Ltd

Building 5, No.24, Industrial East Road, Songshanhu Park, Dongguan, Guangdong, P.R. China

TEL: 0086-0769-88010888 FAX: 0086-0769-81800098



Table of Amendment

| Version | Revision contents | Prepared by | Revised date |
|---------|---|--------------|--------------|
| 1.0 | The first issued | <i>Amway</i> | 2019.05.05 |
| 1.1 | The “Mechanical Structure” changed | <i>Amway</i> | 2020.03.16 |
| 1.2 | The “Pin Definition” changed | <i>Amway</i> | 2020.03.25 |
| 1.3 | 1. Update the mechanical figure, not change the mechanical size. 2. Update the solder wave figure | <i>Amway</i> | 2020.06.30 |
| 1.4 | 1. Correct the holdover condition: $\Delta T = \pm 10^{\circ}\text{C}$; 2. Remove the redundant circle in the mechanical figure, not change the mechanical size | <i>Amway</i> | 2020.08.10 |
| 1.5 | 1. Define the ToD format of the “UART” interface 2. Update LVCMOS input DC characteristics 3. Add 1pps input parameters | <i>Amway</i> | 2022.03.24 |
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1. General Description

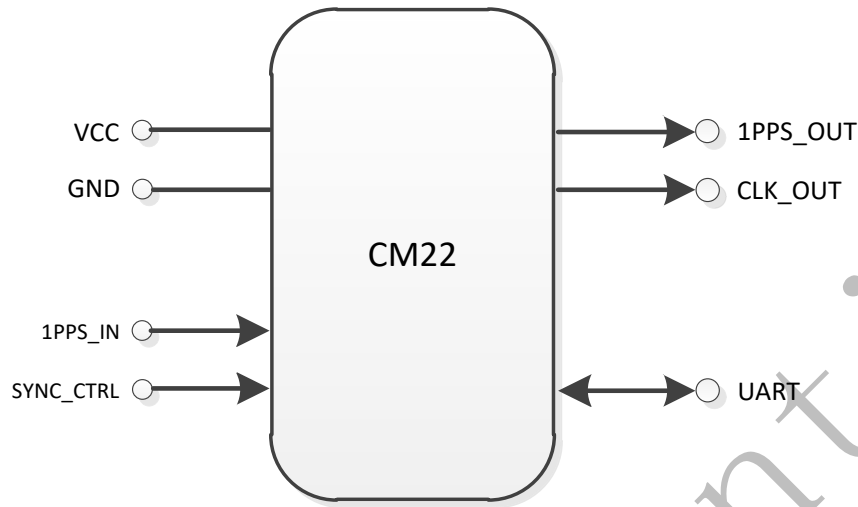


Figure 1 CM22

Figure 1 is the basic diagram of CM22. CM22 is a high-performance clock module designed to provide precise frequency and phase synchronizing with external time reference for telecom and other applications.

Key features:

- **Reference:** 1PPS and TOD from GNSS receiver, IEEE1588 etc.;
- **Temperature Stability:** $\pm 0.3\text{ppb}$;
- **Holdover:** $\pm 1.5\mu\text{s}/8\text{h}$ @ $\Delta T = \pm 10^\circ\text{C}$ after power up 7days;
- **Clocks Input and Output:** 1*1PPS input, 1*1PPS output and 1*10MHz output;
- **Serial Interface:** 1*UART for management and ToD information;
- **Mechanical Size:** 20.2mm*20.2mm*13.0mm.



2. Pin Definition

Table 1 Pin Definition

| Pin group | Pin# | Pin Name | Type | Description |
|-------------------------|------|-----------|------|---------------------------------------|
| Supply Voltage | 2 | VCC | PWR | Power Supply |
| | 3 | GND | GND | Ground |
| Control and Status Pins | 1 | SYNC_CTRL | I | Synchronizing Procedure Control |
| UART | 5 | RXD | I | Asynchronous Serial Data Output/Input |
| | 6 | TXD | O | |
| Input Clock | 4 | 1PPS_IN | I | 1PPS Reference Input. |
| Output Clocks | 7 | 1PPS_OUT | O | 1PPS Output |
| | 8 | CLK_OUT | O | 10.00MHz Output |

3. Electrical Parameters

Table 2 Electrical Parameters

| Parameter | Symbol | Minimum | Typical | Maximum | Units |
|---------------------------|----------|---------|---------|---------|-------|
| LVC MOS Input | | | | | |
| High Level Input Voltage | V_{IH} | 2.0 | | | V |
| Low Level Input Voltage | V_{IL} | | | 0.8 | V |
| LVC MOS Output | | | | | |
| High Level Output Voltage | V_{OH} | 2.4 | | | V |
| Low Level Output Voltage | V_{OL} | | | 0.4 | V |



4. Performance

Table 3 Performance

| Item | Parameter | Minimum | Typical | Maximum | Units | Test Condition | |
|----------------|---------------------------|---------|---------|---------|-------------------|--|-------|
| Clock Output | Waveform | LVCMOS | | | | | |
| | Nominal Frequency | 10.00 | | | MHz | Synchronizing with 1PPS reference. | |
| | Duty Cycle | 45 | 50 | 55 | % | Load 15pF | |
| | Frequency vs. Temperature | -0.3 | | +0.3 | $\times 10^{-9}$ | V _{cc} =3.3V; O _{load} =15pF; T _A varies from -40°C to 85°C, temperature slope less than 2°C per minute. | |
| | Accuracy | -5 | | +5 | $\times 10^{-12}$ | 24 hours average value when locked to 1PPS. | |
| | Short-term Stability | -0.01 | | +0.01 | $\times 10^{-9}$ | V _{cc} =3.3V; T _A =25°C; 1s; no EMI/EMC or other interference. | |
| | Daily Aging | -0.5 | | +0.5 | $\times 10^{-9}$ | V _{cc} =3.3V; T _A =25°C. | |
| | Yearly Aging | -0.03 | | +0.03 | $\times 10^{-6}$ | | |
| | Phase Noise | | | -110 | -100 | dBc/Hz | 10Hz |
| | | | | -143 | -138 | | 100Hz |
| | | | -155 | -150 | 1KHz | | |
| | | | -155 | -150 | 10KHz | | |
| | | | -155 | -150 | 100KHz | | |
| | | | -160 | -155 | 1MHz | | |
| 1 PPS Input | Waveform | LVCMOS | | | | | |
| | Pulse Width | 0.001 | 100 | 500 | ms | | |
| 1 PPS Output | Waveform | LVCMOS | | | | | |
| | Pulse Width | | 100 | | ms | | |
| | Accuracy | -50 | | +50 | ns | Synchronizing with 1PPS reference. | |
| | 8 hours holdover | -1.5 | | +1.5 | μs | ΔT=±10°C, 8 hours holdover after power up 7 days; temperature slope less than 2°C per minute. | |
| Supply Voltage | Supply Voltage | 3.135 | 3.3 | 3.465 | V | | |



| | | | | | |
|-----------------|--|--|-----|---------|--------------|
| Warm Up Current | | | 750 | mA | |
| Steady Current | | | 350 | mA | @25°C |
| AC Ripple | | | 50 | mVpk-pk | 10Hz to 1MHz |

5. UART

UART interface is used for management, which has a fixed baud rate (115200) using 1 stop bit and no parity. It is a LVTTTL-compatible port and needs an external translator to work with other signal types (such as RS-232C or RS-485).

a) TOD input sentence format

\$GPZDA, <1>,<2>,<3>,<4>,<5>,<6>*HH<CR><LF>

| Parameter Number | Parameter Name | Format | Description |
|------------------|----------------|-----------|---------------------------------|
| <1> | UTC time | hhmmss.ss | Hour,minute,second,9 characters |
| <2> | day | dd | Range: 01~31, 2 characters |
| <3> | month | mm | Range: 01~12, 2 characters |
| <4> | year | yyyy | 4 characters |
| <5> | NA | 00 | Filled with 00 |
| <6> | NA | 00 | Filled with 00 |

Note: All sentences begin with "\$", end with<CR><LF>
 * HH represents the bitwise XOR result of all characters between "\$" and "*"
 <CR><LF>: Carriage Return and Line Feed.
 Example: \$GPZDA,010516.00,26,11,2008,00,00*6B

b) TOD output sentence format

\$ESZDA, <1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>*HH<CR><LF>

| Parameter Number | Parameter Name | Format | Description |
|------------------|------------------|--------|---|
| <1> | UTCtime | hhmmss | Hour,minute,second,6 characters |
| <2> | Day | dd | Range: 01~31, 2 characters |
| <3> | Month | mm | Range: 01~12, 2 characters |
| <4> | Year | yyyy | 4 characters |
| <5> | System state | xx | 00Freerun, 01fast track, 10lock, 11holdover |
| <6> | Lock indicator | x | 0unlock, 1 locked |
| <7> | temperature | xxx | Unit: 0.1°C。 e.g.234means23.4°C |
| <8> | Input identifier | x | 1 means 1PPS Input, 0 means no1PPS Input. |
| <9> | GPZDA input | x | 1 means GPZDA Input, 0 means no GPZDA Input. |
| <10> | reserve | 0 | -- |



Note: All sentences begin with “\$” , end with<CR><LF>
 * HH represents the bitwise XOR result of all characters between “\$” and “*”
 <CR><LF>: Carriage Return and Line Feed.
 Example: \$ESZDA,010517,26,11,2008,10,1,315,1,1,0*72

6. Control Pins

CM22 is a clock module which synchronizes the local clock to reference such as 1 PPS retrieving from GPS. CM22 will work normally performing synchronizing algorithm when the SYNC_CTRL pin is driven high. It also could be force to work in free-run or holdover status when the SYNC_CTRL pin is driven low.

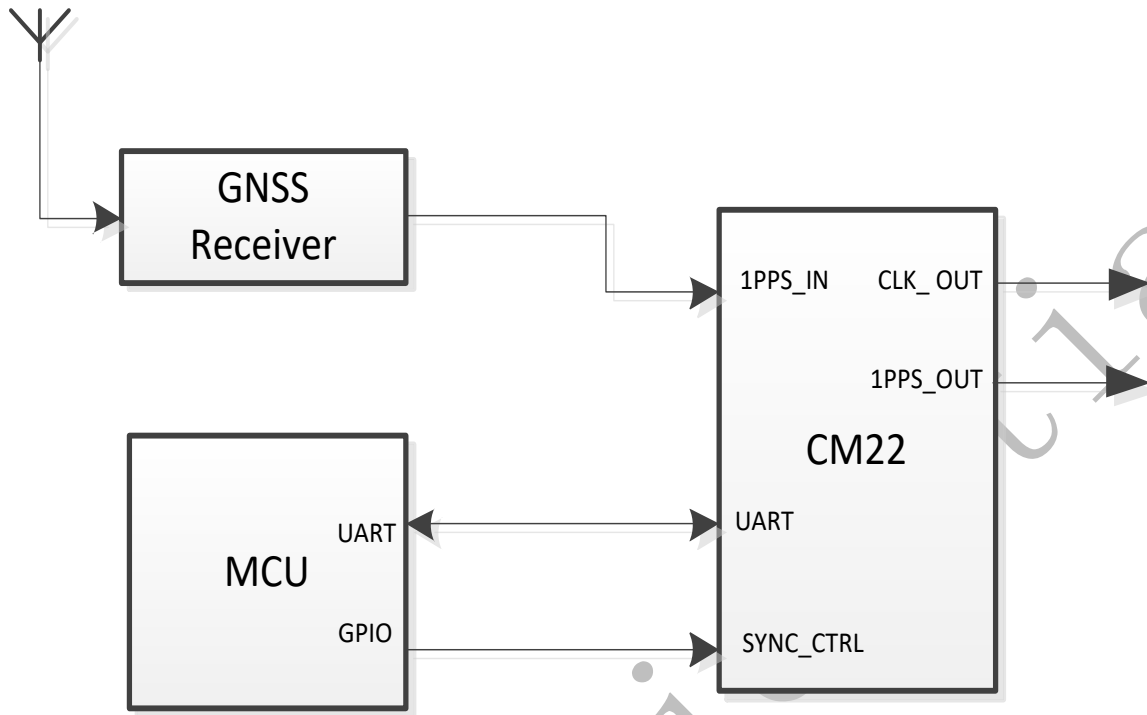
7. Environmental Conditions

Table 5 Environmental Conditions

| Parameter | Conditions | |
|----------------------------|--|----------------------|
| Operating Temperature | -40°C to 85°C | |
| Storage Temperature | -55°C to 105°C | |
| Storage Humidity | 30%~80% | |
| ESD Level | Human Body Model, class2: 2000V to 4000V; ANSI/ESDA/JEDEC JS-001-2010. | |
| | Machine Model, class B: 200V to 400V; JEDEC JESD22-A115C. | |
| Moisture Sensitivity Level | Not humidity sensitive. | |
| Vibration | Test Condition: 0.75mm ;acceleration:10g;10Hz~500Hz, one cycle per 30 min, test 2 hour. (3 times for each 3 directions X ,Y , Z), IEC 68-2-06 Test Fc. | |
| Shock | 50g; 11ms; half sine wave (3 times for each 3 directions X,Y, Z),IEC 68-2-27 Test Ea/Severity 50A. | |
| Relative Humidity | 20%~70% | Full Package Storage |
| Temperature | -10°C~35°C | |



8. Typical Application



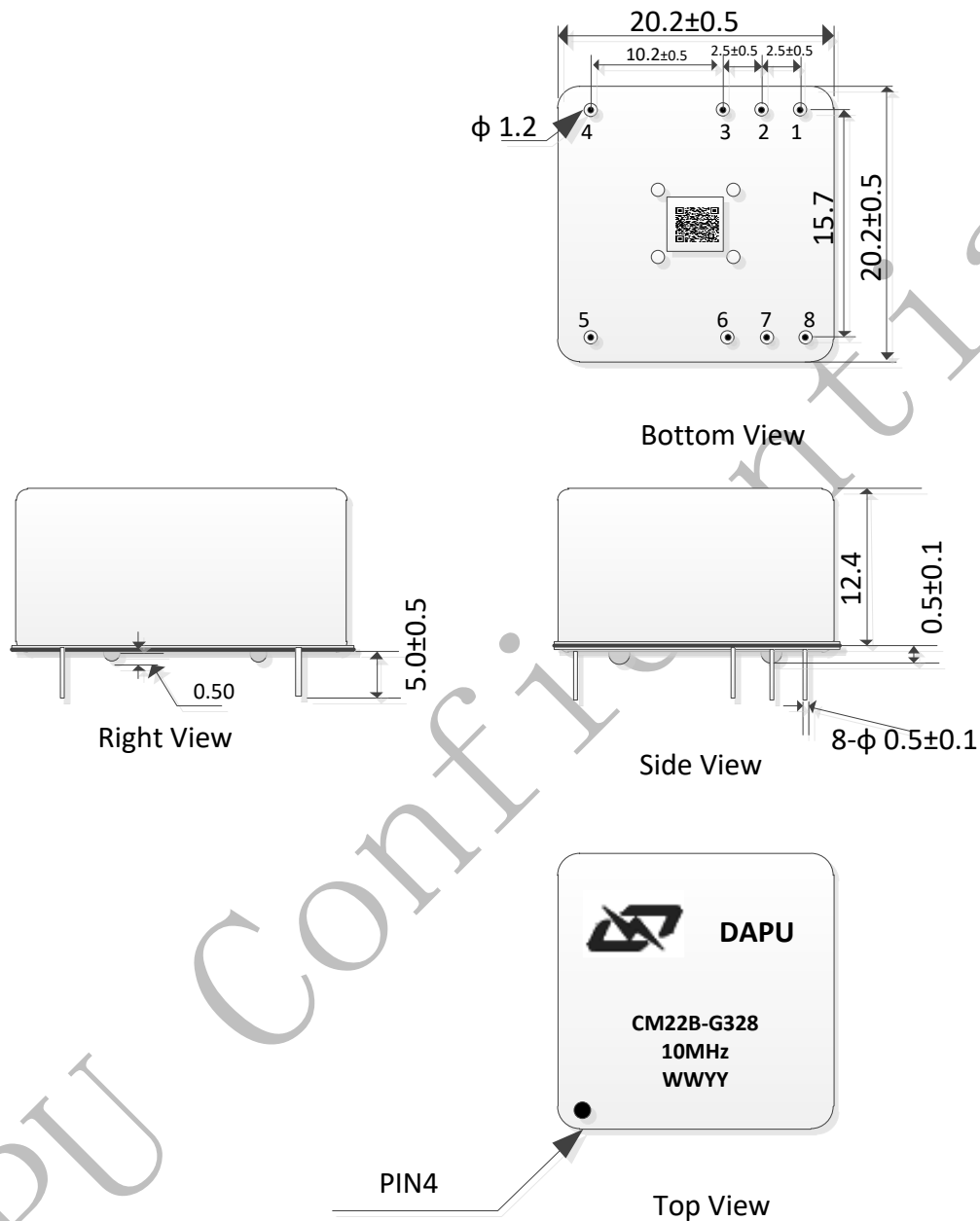
GNSS Receive offers 1PPS signal to CM22.
The MCU monitors the work state of CM22.

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9. Mechanical Structure (mm)



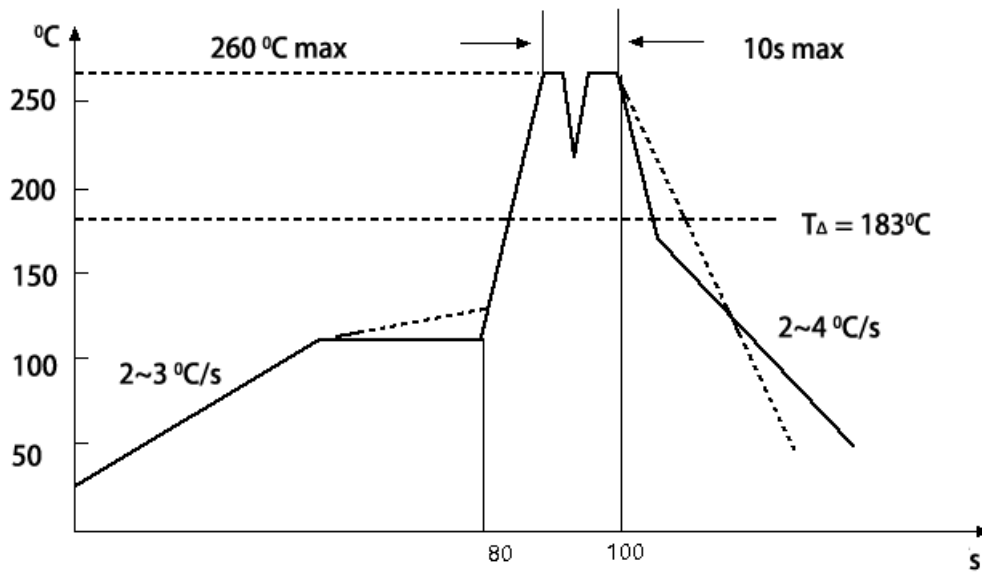
Note1: Tolerance ± 0.3 mm without mark.

Note2: WW represents Week.

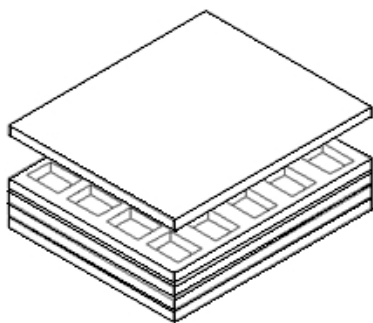
YY represents Year.



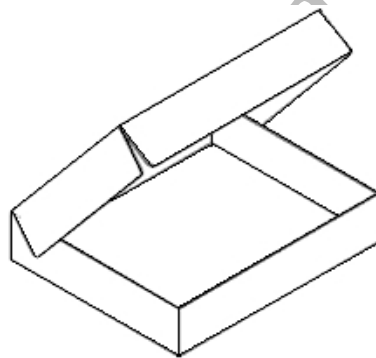
10.Wave Soldering Curve(RoHS)



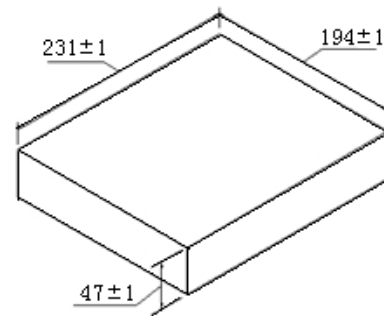
11.Package (mm)



Buffer material



Cardboard
Max 20pcs, circulator



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